

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Patent Application of	)	<b>MAIL STOP</b>
Shinichi Takagi et al.	)	Group Art Unit: 2823
Application No.: 09/987,153	)	Examiner: SHEILA V CLARK
Filed: November 13, 2001	)	Confirmation No.: 6439
For: SEMICONDUCTOR ELEMENT	)	
MODULE AND SEMICONDUCTOR	)	
DEVICE WHICH PREVENTS	)	
SHORT CIRCUITING	)	

**REPLY BRIEF**

Commissioner for Patents  
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Sir:

This Reply Brief is being filed in response to new points of argument raised in the Examiner's Answer dated June 12, 2009.

In responding to the arguments presented in Appellants' main brief, the Answer relies upon the three-step test for recapture that is set forth in MPEP §1412.02, which is reiterated on page 5 of the Answer. In doing so, however, the Answer does not properly apply the third step of that test, namely "determining whether the reissue claims were materially narrowed in other respects, so that the claims may not have been enlarged, and hence avoid the recapture rule." This particular step is discussed in MPEP § 1412.02, subsection I.C. This subsection states that there are two different types of analysis that must be performed to determine whether recapture exists. The first analysis is to compare the reissue claim to any claims cancelled or amended during prosecution. Recapture bars any reissue claim that is as broad or broader in scope than a claim that was cancelled or amended in the original prosecution to define over the prior art. See, e.g. *Ex Parte*

*Eggert*, 67 USPQ2d 1716 (Bd. Pat. App. & Inter. 2003), cited and discussed in Applicant's main brief. Pages 21-26 of Appellants' main brief point out how each of the independent reissue claims is not as broad or broader than an original claim that was cancelled or amended during prosecution.

The second analysis set forth in the MPEP is that a determination must be made whether the reissue claim omits or broadens any limitation that was added or argued during the original prosecution to overcome an art rejection. In essence, the Answer takes the position that the exemplary limitation "wherein said level difference serves to avoid capillary flow of solder to prevent short-circuiting between the leads adjacent to each other" was argued in the original application, and therefore its omission in the reissue claims represents impermissible recapture. In taking this position, however, the Answer overlooks a significant caveat that is set forth in MPEP § 1412.02, I.C. In discussing the second analysis to be performed under the third step of the test for recapture, the MPEP states:

If, however the reissue claim(s) are really claiming additional inventions/embodiments/species not originally claimed (i.e., overlooked aspects of the disclosed invention), then recapture will not be present.

This is precisely the error that was identified in the inventors' Declaration to support the filing of the reissue application. Specifically, the Declaration states:

One error which forms the basis for this belief is the fact that the patent discloses multiple concepts which underlie the invention, but the claims of the original patent are only directed to one of these concepts. Specifically, one of the aspects of the invention is the avoidance of capillary solder flow that results in short-circuiting of the leads of a semiconductor package, when the package is mounted so that it is in contact with a substrate. The features of the invention which pertain to this concept are reflected in the embodiments of Figures 2a-2b, 4a-4c and 5a-5b, for example.

Another aspect of the invention resides in the ability to mount a semiconductor package at a height which is lower than that which could be achieved with prior art devices. This problem is addressed in the patent at column 1, lines 56-61, and the solution provided by the invention is discussed at column 2, lines 13-17; column 4, lines 34-48; column 5, lines 24-36; and column 5, line 66 to column 6, line 4. This aspect of the invention is brought about by the features reflected in the embodiments of Figures 3a-3b and 6a-6b, for example.

The claims of the original patent are all directed to the avoidance of capillary flow. The failure to include claims which independently cover the features of the invention that provide the second aspect noted above, namely reduced mounting height, is an error which renders our patent partly inoperative in the protection of our entire invention.

To further elucidate, the background portion of the patent identifies two problems associated with the mounting of a semiconductor element on a substrate. The first of these problems is identified at column 1, lines 43-50, as represented in Figures 8a and 8b. When a semiconductor element module is mounted on a substrate using through-holes, the element essentially rests on the surface of the substrate. The seam between the semiconductor element and the substrate is conducive to capillary flow of the solder, which can lead to short-circuiting of the leads.

The second problem is identified at column 1, lines 50-61, and is represented in Figures 9a and 9b. When a surface-mount technique is employed, as opposed to the through-hole technique, the semiconductor element leads are bent to be parallel to, and rest upon, the surface of the substrate. Due to the presence of the brazing material that provides a strong connection between the leads and the semiconductor package, the resulting height of the semiconductor package above the substrate is less than desirable.

This mounting height problem is independent of the capillary flow problem discussed above. Consequently, claims that are directed to the solution to this second problem need not recite the avoidance of capillary flow. Rather, they recite other features that enable the leads to be bent at locations closer to the bottom surface of the semiconductor package, which reduces the mounting height of the package. For example, as pointed out in Appellants' main brief, a number of the reissue claims recite that the leads have an open end portion that is bent in an outward direction relative to the side surface of the package, and that is downwardly protruded from a plane including a bottom surface of the package, in combination with a level difference at the side surface of the package adjacent to the bottom surface of the package. This level difference provides a space between the leads and the package, which can accommodate the brazing material. As a result, the leads can be bent at a location that is closer to the bottom surface of the package, to thereby reduce the mounting height.

Since the claims recite that the bent, open end portion of the leads protrude downwardly from a plane that includes a bottom surface of the package, i.e. they extend below the package; they are necessarily directed to embodiments in which the package is mounted at some distance above the surface of the substrate, rather than resting upon the substrate. In such embodiments, capillary flow of the solder is irrelevant, due to the spacing between the substrate and the package.

Consequently, claims directed to this second aspect of the disclosed subject matter, where there is an inherent spacing between the substrate and the semiconductor package, need not include recitations relating to the avoidance of capillary flow.

In the paragraph bridging pages 6 and 7, the Examiner's Answer addresses the recitations discussed above, namely that the open end portion of the leads is bent in an outward direction relative to the side surface of the package, and that this open end portion is downwardly protruded from a plane including a bottom surface of the package. The Answer asserts that this language is no different from the recitation "leads extending along said side surfaces of the package with an open end of each of said leads extending at least to a package attaching plane..." as recited in claim 1, for example. In doing so, however, the Answer overlooks the fact that the recitation of reissue claim 11, for example, states that the bent, open end portion is "downwardly protruded" from a plane that includes a bottom surface of the package. The fact that the open end portion of the leads is bent and extends below the bottom surface of the package precludes the situation described in the Answer, where the attaching plane is congruent with the bottom surface of the package. Such protrusion prevents the bottom surface of the package from resting on the attaching plane.

Finally, in the first full paragraph on page 7, the Examiner's Answer asserts that "capillary flow of solder" defines structure. However, as explained in the background portion of the patent, the capillary flow of solder is a *phenomenon* that can occur when the semiconductor package rests upon the substrate to which it is mounted. The flow of solder itself is not an element of structure, but rather a *process* that is inherent in the relationship of the conventional semiconductor package to the substrate.

For the reasons presented above, as well as those in Appellants' main brief, reissue claims 11-47, 51-54 and 56-62 do not attempt to impermissibly recapture

subject matter that was surrendered in the application for a patent upon which the present reissue is based. Rather, they are directed to a different aspect of the invention that is not the subject of the original patent claims.

The rejection under 35 U.S.C. §251 is not properly founded in the statute, and should be reversed.

Respectfully submitted,

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Date: August 10, 2009

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